Ground Water Protection Program

Annual Report to the Maryland General Assembly

July 2007

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Water Supply Program

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EXECUTIVE SUMMARY

Senate Joint Resolution No. 25 of 1985 requires the Maryland Department of the Environment (MDE) to provide an annual report on the development and implementation of a Comprehensive Ground Water Protection Strategy in the State and on the coordinated efforts by State agencies to protect and manage ground water. This annual report provides an overview of the Fiscal Year 2007 activities and accomplishments of State programs that are designed to implement Maryland's Comprehensive Ground Water Protection Strategy.

Since the development of the original strategy, a variety of State programs at MDE, the Maryland Department of Agriculture (MDA) and the Maryland Department of Natural Resources (MDNR) have endeavored to achieve this goal. These programs continue to be strengthened by the implementing agencies and this report is prepared annually to describe programmatic activities from all three State agencies that contribute toward protecting ground water resources and characterizing the quality and quantity of these resources.

Ground water remains an abundant natural resource that serves as a significant source of drinking water in Maryland. About 31% of the State's population depends on ground water for drinking water supply, and ground water also serves as a critical source of base flow to the State's rivers and streams and a major source of freshwater to the Chesapeake Bay. As population continues to grow in Maryland, the demand for additional ground water supplies is increasing. The ongoing ground water protection efforts described in this report must be continued and strengthened to ensure that this important resource is protected for future generations.

Specific accomplishments for Fiscal Year 2007 (July 1, 2006 – June 30, 2007) are highlighted below:

- The Advisory Committee on the Management and Protection of the State's Water Resources met eight times during FY 2007. The Committee continues to evaluate the complex issues related to managing Maryland's water supply resources. The Committee issued an Interim Report in June 2006, and will publish a final report by July 1, 2008.

- The Maryland Department of Planning and MDE have published written guidance to assist local governments in developing a Water Resources Element for inclusion in their Comprehensive Plans, in accordance with HB 1141, which was signed into law in 2006. The Water Resources Element will ensure that local comprehensive plans fully integrate water resources issues and potential solutions, including insuring that water resources are adequate to meet water supply needs and assimilate treated wastewater.

- The Bay Restoration Fund has awarded grants totaling approximately nine million dollars to ten jurisdictions. The grants will finance approximately 700 septic system upgrades. The highest priority was given to proposals that directly address failing onsite sewage

disposal systems in either the Chesapeake Bay Critical Area or the Maryland Coastal Bays Critical Area, although grants are not limited to these areas only.

- MDE produced the video, "Onsite Sewage Disposal Systems – Protecting Your System – Preserving the Bay". This video, which won a prestigious Aegis Award for video production, teaches homeowners about the care of septic systems and about the connection between septic systems and the Bay while also informing property owners about the availability of BRF funds to upgrade septic systems.

- As of the summer of 2006, MTBE is no longer being added to gasoline being supplied to Maryland. This removal was a business decision by the gasoline suppliers and not a regulatory mandate. MTBE was replaced with ethanol to meet EPA reformulated gasoline standards. It is expected that this change will reduce MTBE levels in ground water over the long term.

- MDE's Oil Control Program improved protection of ground water from contamination by motor fuel by enacting a specialized tank inspection program which requires owners of certain underground storage systems in Maryland to have the storage system inspected by a certified private inspector. The inspector must conduct a detailed site inspection and report to MDE.

- MDE's Oil Control Program also improved protection in High Risk Groundwater Use Areas of certain counties by requiring additional water quality monitoring. Facilities that fail to perform these tests face MDE enforcement actions and the cut off of their fuel supply.

- Senate Bill 970 was signed into law on May 8, 2007 and codified as Chapter 365. This new law exempts most small water users (5,000 gallons per day or less) from the requirement to obtain a water appropriation permit and provides specified penalties for misappropriation or misuse of water. The new law will allow MDE to better allocate resources to address larger and more complex permits, and to better enforce existing permit requirements.

- Phase I work continued on the Regional Coastal Plain Assessment of the Maryland Coastal Plain. Activities included developing a "beta" version of an aquifer information system (a prototype of which was delivered to the Maryland Department of the Environment) and documenting the hydrogeologic characteristics of the aquifer system. The study expected to be completed in 2013, and will facilitate scientifically sound management of the ground water resources in the Maryland Coastal Plain

- MDE has entered into consent agreements with several communities that have committed to growth that existing water supplies can't support. The consent agreements lay out plans for controlling growth, reducing demand, and developing new water sources.

INTRODUCTION AND BACKGROUND

In 1985, the General Assembly passed Senate Joint Resolution No. 25 mandating the development of a Comprehensive Ground Water Protection Strategy for the State of Maryland. The General Assembly charged the Department of the Environment (MDE), the Department of Agriculture (MDA) and the Department of Natural Resources (MDNR) with responsibility for ground water protection in Maryland. MDE was designated as the lead agency for ground water protection. The three agencies formed a steering committee and produced Maryland's Comprehensive Ground Water Protection Strategy in 1986. The Strategy described the State's existing ground water protection programs, established ground water protection goals and made recommendations for improving ground water protection efforts.

The Maryland Ground Water Protection Strategy, originally developed in 1986, is guided by the following goal:

> *The State of Maryland is committed to protect the physical, chemical and biological integrity of the ground water resource, in order to protect human health and the environment, to ensure that in the future an adequate supply of the resource is available, and in all situations, to manage that resource for the greatest beneficial use of the citizens of the State.*

Maryland's environmental, agricultural and natural resources protection programs administered by MDE, MDA and MDNR continue to work to achieve this goal through the aggressive implementation of programs that educate the general public, businesses and industries concerning the importance of water quality protection and water conservation, and appropriately enforce the federal and State laws designed to provide the necessary protection. In addition, Maryland has become a leader in promoting land use practices that minimize the impacts of development in sensitive areas (forests, wetlands, ground water recharge areas, etc.) and encourage the preservation of the State's natural resources by promoting development in regional growth centers where transportation and environmental infrastructure is already available.

This report provides an overview of the condition of Maryland's ground water resources and highlights FY 2007 ground water protection activities.

STATE OF THE RESOURCE

Ground water is an abundant natural resource that serves as a significant source of drinking water in Maryland. About 31 percent of the State's population use ground water as a drinking water supply. In Southern Maryland and the Eastern Shore, ground water meets practically all of the drinking water supply needs. About half of the Marylanders using ground water for drinking obtain water from a well that they own, while the other half obtain their drinking water from public water supplies that use ground water. Ground water is also important as a source of baseflow water in the State's rivers, streams, the Chesapeake Bay and Maryland's Coastal Bays. Other major uses of ground water include agriculture, industry, and energy production.

Geology/Natural Conditions

Geologic conditions vary widely across the State, and produce significant variations in the quantity and quality of ground water. Aquifers in Maryland fall into two major types – unconsolidated Coastal Plain aquifers found east of the Fall Line (a geologic divide that generally coincides with the Interstate 95 corridor), and hard rock aquifers found in the western part of the State. Coastal Plain aquifers, composed primarily of sand and gravel with layers of silt and clay, are productive and generally of good quality. Hard rock aquifers are composed of consolidated sedimentary and crystalline rock, and water availability is low to moderate.

Unconfined aquifers are found throughout the State, and are the primary source of ground water in the western part of the state. Ground water levels in unconfined aquifers undergo seasonal fluctuation and are principally recharged by precipitation during the fall and winter months. Confined aquifers are found in Southern Maryland and the Eastern Shore, and are the primary source of drinking water in those areas. Ground water levels in confined aquifers show a more muted response to short-term variability in climate or precipitation. Water levels in areas of high usage in certain aquifers in Southern Maryland and in the Aquia aquifer in Queen Anne's County show long-term steady declines. Increased water demands from a growing population place new and additional stresses on the State's aquifers, and additional analysis of the State's ground water resources is still needed in order to assess the long-term viability of many of the State's aquifers in the face of increasing demands.

Ground Water Quality Issues

Except in some urban and industrial areas, Maryland's ground waters are generally of good quality and meet drinking water standards. Incidents of serious contamination are usually localized around specific sources. In some areas of the State, vulnerable geologic conditions and local land uses combine to produce ground water quality reflecting negative anthropogenic influence. The areas of the State most vulnerable to ground water contamination are the carbonate rock areas of Allegany, Washington, Fredrick, Carroll and Baltimore Counties, the unconfined Coastal Plain aquifers, the outcrop areas of major confined aquifers along the

Baltimore-Washington corridor and the hard rock aquifers of central and western Maryland. Potential contaminant sources include point sources such as landfills, underground storage tanks, spills, improper discharge of wastes containing solvents (such as dry cleaning fluids) and improper storage of salt or other materials on bare ground. Military installations often present unique risks such as contamination with perchlorate, an ingredient of solid rocket propellent. Nonpoint sources include livestock waste, onsite sewage disposal, application of fertilizers and pesticides, infiltration of urban runoff and road salt application. Nonpoint sources usually do not cause excessive contamination at specific well locations but often represent the largest loadings of pollutants to ground water over large areas. Because ground water contributes a significant percentage of water to surface water flow, delivery and reduction of nutrients via ground water is a significant issue for Maryland and has a major impact on water quality in the Chesapeake Bay.

Local conditions affect both the availability and the quality of ground water. While natural ground water quality is generally good, some areas may have hard water and locally high iron levels may be present. Surveys of naturally-occurring radionuclides in ground water have shown that portions of the Magothy and Potomac Group aquifers in the Coastal Plain (primarily in Anne Arundel County) are subject to high levels of radium. The Piedmont Aquifers of central Maryland often have elevated radon levels. Levels of naturally-occurring arsenic above the federal drinking water standard are not uncommon in the Aquia and Piney Point aquifers in Southern Maryland and the central Eastern Shore. In portions of the carbonate rock aquifers of Central and Western Maryland, ground water may be directly influenced by surface water, presenting the risk of pathogen contamination.

Ground Water Quantity Issues

In the past, Maryland's water resources were generally sufficient to meet all needs. The 1999 and 2002 droughts provided evidence, however, that supplies may not be sufficient if a long-term drought situation occurs. Even under normal climatic conditions, there are examples of water supplies being inadequate to meet current demand, including some communities in Maryland that have imposed building moratoriums due to water shortages. It is likely that the additional pressures of a growing population (Maryland's population is expected to increase by about 1.1 million over the next 25 years) will further challenge the ability of the State's water resources to meet anticipated needs.

Ground water occurrence and availability varies somewhat across the State in relation to the underlying geology. The most productive aquifers are found beneath Maryland's Coastal Plain, which includes the Eastern Shore and Southern Maryland. In these two regions, unconsolidated sediments form layers of relatively porous and transmissive aquifers. West of the Fall Line, ground water occurs in consolidated bedrock, with a relatively lower productivity than Coastal Plain aquifers, although productivity is variable. In the Piedmont region, where aquifers consist largely of fractured, consolidated bedrock, successful ground water production depends on the size and number of water-bearing fractures encountered at a particular well site. Consequently, some fractured-rock aquifers have the lowest yields in the State. Consolidated rocks of sedimentary origin, which can be found in parts of the Piedmont, in the Valley and

Ridge region, and in the Appalachian Plateau region, can yield higher amounts of water than fractured-rock aquifers. Carbonate aquifers have some of the highest yields of consolidated aquifers in Maryland due to the presence of potentially large solution cavities, a factor that also renders them susceptible to contamination from surface sources.

Declining water level trends in some areas of Southern Maryland have raised questions about the long-term sustainability of ground water withdrawals. On the Eastern Shore, increases in agricultural irrigation and the growth of towns and residential areas are expected to place greater demands on ground water supplies. The uncertain degree to which ground water moves between different aquifers in the Coastal Plain is a major obstacle to reliable modeling of their sustained yields in both Southern Maryland and the Eastern Shore. In hard-rock aquifers, the availability of ground water to meet the increasing demands of growing communities is uncertain, particularly where growth is concentrated.

As water demand increases with population growth, communities find it increasingly difficult to find sufficient quantities of water without reaching beyond their boundaries where they have a clear right to withdraw ground water. The need to preserve some ground water as baseflow discharge to local streams further limits its availability for withdrawals. In some areas, water quality concerns can limit the quantity of water available for withdrawal. For example, the threat of brackish water intrusion into the Aquia aquifer beneath Kent Island has precluded its full development as a water source; in other instances, ground water contamination due to human activity has affected water withdrawals on a more localized scale at numerous sites. Overall, estimating the sustainable yield of the State's aquifers will be the single most important step in assessing the risks to the adequacy of Maryland's ground water.

RESOURCE MANAGEMENT

Drought Management

In January 2001, MDE began evaluating hydrologic conditions using a plan developed by the Statewide Water Conservation Advisory Committee. Conditions are evaluated on a regional basis, and drought status is assessed monthly during normal conditions and more frequently during times of water shortage. During a period of drought emergency, MDE coordinates with local governments through a network of local drought coordinators and maintains continual contact with water suppliers to ensure that detrimental impacts of a drought emergency are minimized. Current hydrologic conditions and drought assessment data are available to the public on MDE's website at www.mde.state.md.us/Water/Drought. Regional assessments, however, may not be adequate to predict water shortages at specific localities and/or water systems. Some local governments have developed individualized drought response plans to meet their specific communities' needs.

During FY 2007, hydrologic conditions remained normal for most of the year. Monthly precipitation during the month of May 2007 was somewhat low, resulting in low streamflows in the western and eastern regions, however overall drought status for all regions of the State remains normal.

Ground Water Protection Coordination Activities

The U.S. Environmental Protection Agency (EPA) provides funding through §106 of the Clean Water Act to assist in the coordination of ground water protection activities. Maryland's annual funding for this program is approximately $385,000. These funds are used to support the coordination of activities around the State, as well as for ground water assessment projects, wellhead protection efforts and educational outreach activities.

Data Management

MDE has many decentralized databases that have been established to support programmatic functions. In FY 2007, the Department continued construction of an Enterprise System that will eventually incorporate and link all information in the Department, allowing easy transfer of accurate, up-to-date information among the various programs. The need for and use of Geographic Information Systems (GIS) continues to facilitate more comprehensive analysis and allow more timely decisions within MDE. Counties are also using GIS systems to assist in keeping records of sites with contaminated ground water, well locations and on-site septic locations.

State-County Ground Water Symposium

Each September, the Water Supply Program sponsors the State-County Ground Water Symposium. This event has continued to evolve and develop as a key source of topical information on the most current issues affecting ground water management. In September 2006, the fifteenth annual symposium attracted about 320 sanitarians and other ground water professionals from local governments, State and federal agencies, and private sector organizations. Speakers addressed a variety of ground water-related topics, including new legislation, water supply assessment and planning, onsite sewage disposal technologies, implementation of the State's Bay Restoration Fund initiative, emerging contaminants, new requirements of HB1141, and treatment alternatives.

Monitoring and Assessment

Coastal Plain Ground Water Study

The 2003 Advisory Committee on the Management and Protection of the State's Water Resources identified the need for a comprehensive assessment of ground water resources in the Maryland Coastal Plain, where population is expected to grow by 44 percent between the years 2002 and 2030. Withdrawals from the confined aquifers of the Coastal Plain in Southern Maryland and the Eastern Shore have caused water levels in some aquifers to decline by tens to hundreds of feet from their original levels, and the rate of decline is expected to increase as the population in these areas grows. A more comprehensive understanding of the confined aquifer systems and how much water is available in these systems is needed in order to make sound management decisions and appropriately evaluate water withdrawal requests. The first phase of a three-phase Regional Coastal Plain Assessment began in 2006.

In 2007, the U.S. Geological Survey (USGS), Maryland Geological Survey (MGS), and MDE continued their Phase I work (2006-2008) on the Regional Coastal Plain Assessment of the Maryland Coastal Plain. Activities included developing a "beta" version of an aquifer information system (a prototype of which was delivered to the Maryland Department of the Environment) and documenting the hydrogeologic characteristics of the aquifer system. Future assessment activities will include conducting detailed studies of the regional ground water flow system and water budget, improving documentation of patterns of water quality in the aquifers, enhancing ground water level, streamflow, and water quality monitoring networks, and developing tools to facilitate scientifically sound management of the ground water resources in the Maryland Coastal Plain. Phase I activities are being jointly supported by funds and services from MDE, MGS, and USGS. Phases II and III will require significant additional investment from current and new funding partners from 2008 to 2013.

Fractured Rock Ground Water Study

Based on a recommendation by the Advisory Committee on the Management and Protection of the State's Water Resources, MDE worked with the Maryland Geological Survey and the U.S. Geological Survey to develop a proposal for studying ground water resources west of the Fall Line, in particular the Piedmont region where water supply issues have resulted in a

number of situations where local water suppliers are unable to meet their current or projected water supply needs. A proposal was developed, but funding has not yet been identified to support this project.

Maryland Ground Water Quality Monitoring Network

The Maryland Ground Water Quality Monitoring Network is an ongoing monitoring effort intended to document the chemical quality conditions of Maryland aquifers. In 2006, efforts focused on evaluating shallow groundwater quality in central and western Maryland, and on sampling selected confined-aquifer wells in the Coastal Plain. Eight shallow wells were drilled adjacent to deeper observation wells in the Piedmont to observe the relation between shallow and deep groundwater systems in the hard-rock areas of the State. This action was one of the recommendations of the 2003 Advisory Committee on the Management and Protection of the State's Water Resources. Preliminary data indicate that in some cases there are distinct hydrochemical differences between the shallow and deep flow systems. Water samples were also taken from several confined-aquifer wells in the Coastal Plain, including two test wells in the Patuxent aquifer at the Chalk Point and Morgantown Power Plants. These wells provided water-quality data in previously unsampled downdip parts of the Patuxent aquifer.

Patapsco Aquifer Hydrogeologic Study

The MGS continued a study begun in 2001 of the hydrogeologic characteristics and water supply potential of the Patapsco aquifer system in southern Maryland. The objectives of the project are to obtain additional hydrogeologic information regarding the upper, middle, and lower Patapsco aquifers in Charles, Calvert, and St. Mary's Counties, to integrate these data into a quantitative assessment of the aquifers' capacity to supply future water demands in the tri-county region, and to construct observation wells to monitor future changes in Patapsco water levels. Preliminary analysis indicates that even though the Patapsco aquifers are widely distributed, their water-producing properties are locally variable. During FY 2007, work continued toward finishing the final report, publication of which is expected in FY 2008.

Optimization of Ground-Water Withdrawals from the Patapsco and Patuxent Aquifers in Anne Arundel County

MGS continued a study to determine the effects of projected withdrawals (through 2040) on water levels and recharge for the Patapsco and Patuxent aquifers in Anne Arundel County. Optimum withdrawal rates from existing and hypothetical production wells were determined that minimize water-level declines. Model results indicate that when drawdown is minimized through selection of optimum pumping rates, the project demand from the Upper Patapsco, Lower Patapsco, and Patuxent aquifers can be withdrawn without causing water levels to fall below the 80-percent management level. The report is expected to be in print in late FY 2007.

Evaluation of salt-water intrusion into Maryland's coastal aquifers

Aquifers in several coastal areas of Maryland have experienced salt-water intrusion as a result of overpumping of the aquifers. The Maryland Geological Survey continued its monitoring and assessment efforts related to saltwater intrusion in FY 2007. Annual groundwater-quality monitoring continued on Kent Island, where salt water has intruded into the Aquia aquifer on the eastern shore of the Chesapeake Bay. At Ocean City, chloride concentrations from intruding seawater approach undesirable levels at some locations; the Maryland Geological Survey has advised the Town of Ocean City on this issue for many years. In 2007, a groundwater flow model and solute-transport model were developed for Ocean City to simulate groundwater levels and chloride concentrations in the Ocean City's aquifers through the year 2025.

Watershed Assessments

MDE's Water Supply Program (WSP) recently initiated a statewide effort to evaluate watersheds by assessing the available water supply within a watershed as it relates to existing and future water demands. Although resources for this effort are limited, the goal is to provide regulators, planners and water suppliers with information that can serve as a guide when planning for future water needs. In FY 2006, WSP conducted an assessment of the Catoctin Creek watershed in Frederick County. The Catoctin Creek study indicates that while water supplies appear to be adequate to meet annual water needs, projected demand may result in withdrawals that exceed recharge levels during the summer months, when aquifer recharge is low due to seasonal uptake by plants. Since the seasonal period of low recharge coincides with the typical period of highest water use, the study indicates that water resources in the piedmont region may be vulnerable to overuse during the summer months. Further study is needed to better define the extent and significance of this issue. In 2007, MDE began studying the South Branch Patapsco watershed, which is located in parts of Carroll, Frederick, and Howard Counties.

Planning Activities

Advisory Committee On The Management And Protection Of The State's Water Resources

Based on recommendations of the 2003 Advisory Committee on the Management and Protection of the State's Water Resource and the 2005 Maryland General Assembly, a second Committee was formed in 2005 to complete and supplement the work of the 2003 Committee. The 2005 Committee is charged with reviewing the latest information on the State's water resources, assessing the adequacy of existing laws and regulations, and recommending comprehensive strategies for the development, management and protection of the State's water resources. The Committee produced an Interim Report in June 2006. A final report is due July 1, 2008.

The Committee met eight times during FY 2007. Since December 2006, two subcommittees have been working to evaluate and formulate recommendations regarding two specific issues. The Water Quality Subcommittee is evaluating water quality issues in the State as

they relate to water supply. The Finance Subcommittee is seeking to refine the preliminary budget outlined in the Interim Report, and identify potential funding sources to support water resources management activities. The Advisory Committee is also studying State activities related to demand management and water reuse, as well as considering alternatives to the State's current water allocation policies.

HB 1141

During the 2006 legislative session, the Maryland General Assembly passed HB 1141, which was signed into law on May 2, 2006 and codified as Chapter 381. This law added new requirements for local governments to more thoroughly examine the effects of proposed land use on streams and wetlands, forest and agricultural conservation lands, water supplies and water quality to avoid negative impacts to the State's natural resources. In particular, the law requires local governments to include a Water Resources Element in their Comprehensive Plans, and requires MDE to provide data and technical assistance to local governments, and to review the Water Resources Element. Maryland's county and municipal governments have long had the primary responsibility for land use planning under existing State law. These provisions will enhance local planning efforts by requiring them to ensure that water resources will be adequate for both water supply and as suitable receiving waters for waste disposal. MDE and the Department of Planning (MDP) will be assisting local governments in implementing the new requirements. Requiring land use plans to consider these critical needs as early in the process as possible will ensure that plans are realistic and environmentally sustainable.

During FY2007, MDE actively coordinated with the Maryland Department of Planning (MDP) to develop guidance for local governments on implementing the requirements of HB1141. The Water Resources Guidance, which is intended to assist local governments in developing and implementing their Water Resources Element, was finalized and distributed in June 2007. MDE will work with MDP to host a series of workshops related to the new requirements during the Fall of 2007.

Piedmont Water Supply

Maryland follows the Reasonable Use Doctrine of water rights, which holds that every property owner has a right to make a reasonable use of the water associated with his or her property, as long as the use does not have unreasonable impacts on the water resource, or on other users of the resource. When evaluating available water supplies for a community, the Water Supply Program uses a water balance criteria, which requires the community to own land with sufficient water resources to support the desired water use. Development in accordance with Smart Growth principles tends to concentrate water use in high-density population areas. These areas do not always have sufficient local water sources available to meet concentrated demand. In particular, towns that rely on ground water from hard-rock aquifers may exceed the sustained yield of their water supply aquifers as high-density growth occurs. Only towns using ground water as their sole source struggle with the problem of needing sufficient land area to meet their water supply needs, as the water balance criteria is not applied to surface water

withdrawals when issuing water appropriation permits. Towns relying on water from coastal plain aquifers, such as occur in Southern Maryland and the Eastern Shore, generally are unaffected due to the high ground water recharge rates associated with their more permeable aquifers.

This issue is currently being studied by the Advisory Committee on the Management and Protection of the State's Water Resources in relation to MDE's overall water allocation policies. New approaches and alternative water supplies are needed to ensure that growing areas of the State continue to meet their water supply needs. In particular, some areas of the Piedmont region may need to consider building new surface water storage facilities (i.e. reservoirs), and/or limiting or redirecting growth. MDE is seeking funding to support a proposal developed by MDE, MGS, and USGS to study water supply issues in this region.

Water and Sewerage Planning

Counties are required by law to develop and maintain water and sewerage plans to provide for the orderly development and extension of community water supply and sewerage systems. The Advisory Committee on the Management and Protection of Maryland's Water Resources found that there is a need for significant improvement in many of these plans in order to better fulfill their potential as a water supply and resources planning tool. The Committee recommended more meaningful technical and financial support to county governments to assist them in preparing stronger and more comprehensive water and sewer plans. In January 2005, the Water Supply Program began reviewing county water and sewerage plans to identify and address issues pertaining to source water protection, water supply capacity and Safe Drinking Water Act requirements. During FY 2007, 115 plans or amendments were reviewed. An Interagency Technical Advisory Committee on Wastewater Treatment Systems (ITAC) finalized a report to the General Assembly in 2006.

Public Water System Oversight

Ground water continues to be a reliable and safe source of drinking water for many thousands of Maryland residents. The Water Supply Program (WSP) is responsible for ensuring safe and adequate public drinking water in Maryland. Statewide, there are about 495 public drinking water systems, of which about 438 use ground water as their only water source. These ground water systems serve more than 600,000 residents. Additionally there are more than 3,000 Maryland facilities relying on ground water that are defined by the Safe Drinking Water Act as non-community public water systems. These small facilities include schools, day care centers, office buildings, restaurants, churches, community centers and campgrounds that have their own ground water wells.

New Regulatory Initiatives

Although aimed primarily at surface water systems, the Surface Water Treatment Rules apply to ground water systems where the source is under the direct influence of surface water. Two separate enhancements of the Surface Water Treatment Rule are currently being implemented for ground water systems. The Long Term 1 Enhanced Surface Water Treatment Rule was adopted in Maryland in April 2005. MDE implements the regulation, which requires water systems to employ certain treatment techniques, including maintaining appropriate turbidity levels, in order to reduce the risk of *Giardia* and *Cryptosporidium* contamination in the water supply. The Long Term 2 Enhanced Surface Water Treatment Rule was finalized by EPA in January 2006. Under this new regulation, surface water systems and groundwater under the influence systems are required to monitor for *Cryptosporidium* and *E. coli* in order to determine the vulnerability of the source water, and to determine what treatment improvements must be completed in the next ten years in order to provide 5.5-6.0 log removal of *Cryptosprodium.* The largest water systems began testing in 2006; smaller water systems will be phased in over a three-year period.

On October 12, 2006, the Environmental Protection Agency finalized the Ground Water Rule, which is intended to provide increased protection against microbial pathogens in public water systems that use ground water sources. The new rule will apply to public water systems that serve ground water. The rule also applies to any system that mixes surface and ground water if the ground water is added directly to the distribution system and provided to consumers without treatment. MDE is currently reviewing the new regulation to assess its impacts on Maryland's drinking water program.

Water Quality Monitoring

A significant amount of sampling occurs at public water systems to determine if the water being supplied is in compliance with State and federal drinking water standards. Sampling requirements depend on system type, system size, source type, system vulnerability and contaminant. Community ground water systems are subject to monitoring requirements for over 90 contaminants that have health-based standards or maximum contaminant levels. More than 40 other unregulated contaminants are also tested at some systems. Small public drinking water systems often use ground water with little additional treatment. The most common treatment objectives to improve ground water quality, in descending order, are: disinfection, pH adjustment, iron removal, corrosion control, inorganics removal, softening, particulate removal, organics removal, manganese removal and radionuclide removal.

Wellhead Protection

In order to protect important public water supply sources, Maryland has developed and implements the Wellhead Protection Program (WHPP), a preventive program designed to protect public water supply wells from contamination by establishing a wellhead protection area (WHPA) around each well. Existing and potential contamination sources are identified and

management plans are developed to identify the best means for protecting the sources. EPA approved Maryland's Wellhead Protection Program in June of 1991. The program coordinates wellhead protection activities among State agencies, public water suppliers, local governments and the public. The WSP assists local governments in delineating WHPAs and in developing management programs to protect water supplies within the wellhead protection areas. Participation at the local level is voluntary.

Maryland has completed source water assessments for all public ground water systems, which included recommendations for protection of the water supply. Water suppliers are strongly encouraged to develop and implement protection measures. In FY 2007, the Town of Poolesville finalized a wellhead protection ordinance for the protection of its water supply. This was a follow up to a wellhead project that the Town completed with a grant from MDE. In May 2007, Frederick County adopted amendments to the County Code on Wellhead Protection and Storage Tanks. This will provide protection to community water systems from sources of contamination. MDE is developing a strategy to assist water system owners and operators in adopting wellhead protection for their drinking water supply.

WSP staff continued to work closely with the Maryland Rural Water Association's (MRWA) ground water technician during the past year to promote wellhead protection for the small public water supplies in Maryland. The technician has met with water suppliers and community representatives throughout the State, and provides an important link between MDE and local water supply protection efforts. WSP staff took an active role in MRWA's Ground Water Forum where MRWA seeks input from water suppliers and MDE on priority ground water protection issues for the upcoming year. MDE has provided MRWA funds to purchase and install Drinking Water Protection Area signs in wellhead protection areas for several systems interested in protecting their water supply. Signs have been installed at wellhead protection boundaries for seven systems.

Well Siting

One priority for the WSP is to ensure the safety of new public water supplies by reviewing and evaluating proposals for the siting of new wells. To ensure that wells are sited in the safest locations, staff review Departmental databases to identify existing or potential contamination sources, and use site investigations to verify this information and evaluate any additional factors that might influence the safety of the water supply. In FY 2007, WSP reviewed proposals for the siting of approximately 46 new public water supply wells.

Water Appropriation Permitting

Pressures of land development place an increasing demand for the development of ground water resources. Not only is ground water a major source of drinking water in the State but it is the only feasible source on the Maryland Atlantic Coastal Plain. MDE's Water Supply Program has the responsibility of controlling the impacts of ground water withdrawal through the water appropriation and use permit process.

New requirements for obtaining water appropriation permits went into effect during 2007. Senate Bill (SB) 970, which was signed into law in May 2007 and codified as Chapter 365, exempts most ground water withdrawals of 5,000 gallons per day (gpd) or less from the requirement to obtain a permit. Public drinking water systems and withdrawals located in ground water management strategy areas must still obtain a permit. Other exemptions include temporary construction dewatering (up to 30 days and 10,000 gallons per day), creation of small subdivisions (10 lots or fewer), individual domestic use, agricultural use under 10,000 gallons per day and extinguishing a fire. SB 970 also enacted civil penalties for violations of appropriation regulations or failing to comply with a water appropriation and use permit. These changes are expected to free up staff time to focus on the larger and more complex permit applications, and will allow MDE to more effectively enforce the permit requirements.

Each permit application is evaluated for the reasonableness of the amount of water planned for a particular use and the impact of that use on the resource and other users of the resource. Aquifer testing, fracture trace analysis, water level monitoring, the development of a water balance and other investigation techniques are part of the evaluation. Through the permit review process, the Water Supply Program attempts to avoid impacts to other water users and assures that ground water withdrawals do not exceed the sustained yield of the State's aquifers.

In addition, MDE has delineated some areas for special management considerations. These management considerations may limit withdrawals in a certain aquifer, direct withdrawals to a different aquifer, or require additional scrutiny and/or water level monitoring when permits are requested for these areas. An example is Kent Island where, to prevent further degradation of the Aquia aquifer from salt water intrusion, new appropriations are directed to deeper aquifers. Special management considerations are also taken into account when permitting withdrawals for the Aquia aquifer in the Annapolis Neck area of Anne Arundel County, the Potomac Group aquifers in the Elkton area of Cecil County, the Patapsco aquifer in the Indian Head area of Charles County, the Manokin aquifer at Princess Anne in Somerset County, and the Pleistocene aquifer beneath Ocean City. The Maryland and U.S. Geological Surveys maintain monitoring wells to measure chloride levels at Kent Island and Ocean City. These systematically maintained data networks characterize trends caused by long term changes in natural and anthropogenic conditions, help to determine the success or failure of best management practices and regulatory policies and provide an historical record to calibrate computer models so that predictions of future conditions have scientific validity.

Steadily declining well water levels are a matter of concern to local residents in some areas of the State. Telescoping wells constructed with small diameter casings have resulted in the inability of homeowners to lower pumps and continue to withdraw water as the potentiometric surface declines. Usually, additional water is available but cannot be tapped by inadequate wells. Special construction conditions placed on permits have been developed with licensed drillers and local environmental health programs to require a minimum 4-inch casing to greater depths. The aquifers requiring scrutiny are the Aquia, Piney Point, Magothy and Patapsco Formations that are used heavily on the Coastal Plain and in the Washington-Baltimore metropolitan area. The water

level data that is obtained by the Maryland and U.S. Geological Surveys is used in evaluating water appropriation and use permit applications. Ground water modeling helps to project the impacts of comprehensive land use plans and directs future development.

MDE has entered into consent agreements with several communities in the Piedmont region, including the City of Frederick, the Town of Mt. Airy, the City of Westminster, the Town of Middletown, and the Town of Taneytown. These communities have committed to growth that they can't support with existing water supplies. One problem is that the available yield from wells often does not provide the amount of water that the system was permitted to withdraw, or that the original pump tests indicated that the wells would achieve. Due to robust growth over the past several years, the existing water supply systems were found to be inadequate to meet existing and/or projected demand and have been forced to impose moratoriums on new subdivision plats, annexations, and building permits. The communities have each entered into consent agreements with MDE that outline their plans for meeting water supply needs. Plans include measures to reduce demand, manage growth, and seek alternative water supplies.

Agricultural water use has been growing steadily in recent years, particularly for irrigation on Maryland's Eastern Shore. In general, MDE directs large irrigators to use the unconfined aquifers, reserving the more protected confined aquifers for individual potable and municipal uses. In some areas, however, the unconfined aquifer produces low yields, or is nonexistent, compelling an increasing number of farmers to seek water appropriation permits for confined aquifers.

WATER QUALITY PROTECTION AND RESTORATION

Drinking Water Quality Issues

Arsenic

The Water Supply Program works closely with public water systems to ensure compliance with new federal and State regulations. As of January 23, 2006, the drinking water standard for arsenic lowered to 10 parts per billion from 50 parts per billion. The lower arsenic standard will help to reduce the risk of cancer resulting from exposure to arsenic in drinking water. Of the 55 public water systems in Maryland with arsenic levels above the revised standard, 33 systems are now in compliance, 14 systems received extensions to the deadline, and eight systems are in violation. MDE continues to work with the water systems to assist them in achieving compliance with the standard.

In Maryland, any drinking water standard adopted for public water systems also applies to individual water supplies. Local health departments have sampled extensively in Southern Maryland and Eastern Shore counties over the past two years to determine the extent and degree of arsenic contamination in these areas. MDE is working with these counties to implement programs to ensure that new wells are tested and appropriate treatment is employed, and to educate owners of existing wells about the health risks associated with the elevated arsenic levels and provide information about appropriate treatment options. One component of the education process involves distribution of letters to parents and guardians at schools with public water systems that exceed a drinking water standard.

MTBE

During the summer of 2006 Maryland saw the removal of MTBE from the gasoline being supplied to the State. This removal was a business decision by the gasoline suppliers and not a regulatory mandate. MTBE was replaced with ethanol to meet EPA reformulated gasoline standards.

Although removed from gasoline, MTBE still continues to be detected in ground water. The MDE predicts that there will be years of legacy cases related to MTBE. Over the long term, however, new detections of MTBE are expected to decrease.

Perchlorate

Perchlorate is a contaminant that is used in fuel propellants for rockets, missiles, and fireworks. Although there is no federal drinking water standard for perchlorate, it has been shown to affect the thyroid by interfering with iodide uptake, and may cause cancer, Graves' disease, and developmental problems in children. Water quality samples in Maryland indicate several

areas of ground water contamination from perchlorate, including the area west of Elkton in Cecil County, and in the vicinity of the Aberdeen Proving Grounds (APG) in Harford County. Perchlorate contamination has been documented in three public water supply wells serving the City of Aberdeen, in wells used by an industrial plant that manufactured rocket fuel, and at two small community water systems in Cecil County. The City of Aberdeen has installed treatment to remove the perchlorate contamination, and the water system is routinely monitoring water quality to maintain perchlorate levels below 1 ppb as advised by the Department. In Cecil County, a treatment unit was installed which is currently serving both of the small community water systems that are impacted by perchlorate. The State is supplying bottled water to residents where wells have shown perchlorate concentrations above 1 ppb. A Remedial Investigation/Feasibility Study has been initiated at a former fireworks facility believed to be the source of the contamination. The US EPA expects to make a decision by Fall 2007 on whether to set a national health-based drinking water standard for perchlorate. While data do not suggest that perchlorate occurs at levels of public concern in the vast majority of public drinking water supplies, a small sensitive subpopulation, including pregnant women and developing fetuses, is of significant concern.

Radium

Over the past several years, MDE has worked with Anne Arundel County to address elevated levels of radium in ground water in the Magothy, Patapsco, and Patuxent aquifers of the northern central portion of that county. The county health department currently requires new wells in the affected area to be sampled for gross alpha and radium, and if test results indicate radionuclides above the drinking water standard, owners must employ treatment to remove the radium prior to obtaining a certificate of potability for the well. Sampling of ground water in Baltimore and Howard Counties indicates that a small percentage (about ten percent) of wells in the formation known as Baltimore Gneiss also contain elevated levels of gross alpha.

Viruses

EPA finalized the Ground Water Rule in October 2006. This rule is aimed at protecting consumers from microbial pathogens in ground water, particularly viruses. The regulation will require source water monitoring to identify vulnerable systems, and all treatment will be required to achieve 99.99 percent inactivation or removal of viruses. From 1998 to 2001, MDE worked with the U.S. Geological Survey to study virus occurrence in Maryland public drinking water systems, in both coastal plain and piedmont geologic settings. The study found that viruses are not commonly found in ground water systems in either setting. MDE is currently evaluating the impact of the new regulation on Maryland systems.

Emergency Response

MDE's Emergency Response conducts immediate removals of oil and hazardous materials that threaten both surface and ground waters. Each year Emergency Response responds to approximately 650 spills of hazardous materials and petroleum products on land and

water. These spills are handled in a way to protect public health and safety and to minimize the contamination of water resources.

Ground Water Remediation and Restoration

Land Restoration

The federal "Superfund" program, authorized by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), was established to identify, prioritize and cleanup hazardous waste sites. The Waste Management Administration ensures that State requirements are met during investigation and cleanup of sites designated for the National Priority List (NPL) and federal facilities under the federal "Superfund" program. A key objective of the federal program is to obtain the data necessary to identify for cleanup the highest priority sites posing threats to human health and the environment.

A similar program under State law, the State Superfund Program, conducts investigations and oversees the remediation and cleanup of sites on the State Master List that are not included on the NPL or are not owned by the federal government. The State Master List contains 367 sites that have been identified statewide with known or potential contamination. An additional 240 sites transferred from the Hazardous Waste Program for evaluation and ranking are also being investigated.

The Voluntary Cleanup Program provides a streamlined process for the remediation and redevelopment of former industrial or commercial properties that are contaminated or perceived to be contaminated with controlled hazardous substances. Upon successful completion of the program, participants are also provided limitations on liability for the eligible property. Since the inception of the Voluntary Cleanup Program in 1997, applications for 328 properties representing over 5,683 acres have been received and 191 properties, totaling 2,596 acres, have each received a Certificate of Completion or a No Further Requirements Determination. The majority of these sites were issued a prohibition on the use of ground water beneath the property for any purpose.

Oil Control

A major cause of releases from Underground Storage Tank (UST) systems has been the corrosion of bare steel tanks and lines. Releases from USTs are required to be investigated and those with ground water impacts are required to define the vertical and horizontal extent of the contamination. Once defined, a Corrective Action Workplan is implemented to mitigate the impact of the contamination. The effectiveness of remediation systems is normally evaluated through ground water monitoring. The Oil Control Program (OCP) has tracked reports of over 10,000 confirmed underground storage tank system releases from other than heating oil tanks throughout Maryland. Of these releases, over 9,000 site cleanups have been completed. The OCP continues to provide oversight at those sites where cleanups have been initiated.

Onsite Sewage Disposal

The Department has delegated to the counties the authority for administering the on-site sewage disposal, subdivision of land and well construction programs. MDE personnel oversee the delegated programs, provide technical support, investigate potential public health threats and perform on-site evaluations of innovative and alternative sewage disposal system applications. A strong field presence and ongoing training efforts are vital to the implementation of these important public health laws. An estimated 420,000 homes in the State use an onsite sewage disposal system for sanitary wastewater.

The program actively promotes the use of alternative systems. As a rule, alternative systems better protect ground water resources than do conventional systems. Alternative systems approved for use in Maryland include: recirculating sand filters, advanced waste treatment units, sand mounds, waterless toilets and at-grade systems. Research continues on emerging new on-site sewage disposal technologies, with emphasis on those technologies that reduce discharges of nitrogen. These technologies include recirculating filters and certain aerobic treatment units.

Bay Restoration Fund

The Bay Restoration Fund was signed into law on May 26, 2004. The Chesapeake Bay has experienced a decline in water quality due to over-enrichment of nutrients (mainly phosphorus and nitrogen). The law establishes a dedicated fund for improving Chesapeake Bay water quality. In addition to financing wastewater treatment plant upgrades, the Bay Restoration Fund finances onsite disposal system (septic system) upgrades and implements cover crop programs to reduce nitrogen loading to the Bay from ground water. More than 7.5 million pounds of nitrogen and more than 260 thousand pounds of phosphorus will be reduced each year, which will meet over one-third of Maryland's nutrient reduction commitment under the Chesapeake Bay 2000 Agreement.

Identifying and Billing OSDS Users

- Beginning immediately after the signing of the Bay Restoration Act in 2004, MDE worked with the Governor's Advisory Committee, the State Department of Assessment and Taxation, the Maryland Department of Planning, the Maryland Municipal League, the Maryland Association of Counties and all 23 Maryland Counties and Baltimore City to identify all onsite sewage disposal system (OSDS) owners in Maryland and establish a billing program to collect the required $30 per year fee. The billing program was successfully implemented beginning in October, 2005, as required by the Act.

- As of October 31, 2006, the Comptroller of Maryland has collected a total of $14,997,256, of which $8,998,353 (60%) has been allocated to the Maryland Department of the

Environment for the Septic System upgrade fund and $5,998,902 (40%) to the Maryland Department of Agriculture for Cover Crop initiatives.

- MDE negotiated meomorandums of understanding with Towson and Salisbury Universities to develop a statewide geographic information system (GIS) data layer that will provide the geographic location and significant information for all septic systems in the State. This data will allow for improved modeling on septic system impacts, help direct available funding to areas where upgrading septic system will make the biggest impact and improve the accuracy of billing OSDS users.

Identifying Participants for OSDS Upgrade

The goal of the OSDS portion of the Bay Restoration Fund is to curtail the amount of nitrogen discharged from OSDS into the waters of the State. This benefits the State by helping to restore the estuarine environment and provides for better protection of drinking water supplies. The Bay Restoration Fund statute states that funds may be used to provide grants for the incremental cost of upgrading OSDS to best available technology (BAT) for nitrogen removal. The Bay Restoration Fund cannot provide funding for an entire OSDS replacement or repair and any material (gravel, pipe, etc.) and labor costs not directly associated with the BAT unit installation. The Department recognizes that operation and maintenance, design review, installation inspection and project management are part of the costs of upgrading OSDS to BAT for nitrogen removal. The BRF grant funds will cover the initial cost of purchasing and installing the BAT unit. The cost for the initial 5 years of operation and maintenance may also be included in the cost of purchasing the BAT technology. The local implementing entity may also use a portion of the BRF funds for reasonable costs associated with identifying individual applicants, reviewing plans, and inspecting BAT unit installations.

In cooperation with the Advisory Committee, MDE developed a Request for Proposals (RFP) for local governments to obtain funding through the BRF to support the planning, design and construction of BAT OSDS systems in targeted watersheds, with priority to failing systems in the Critical Area of the Chesapeake Bay and the Coastal Bays. The highest priority was given to proposals that directly address failing OSDS in either the Chesapeake Bay Critical Area or the Maryland Coastal Bay's Critical Area, although grants are not limited to these areas only.

A review panel consisting of personnel from MDE and the Governor's Advisory Committee evaluated and ranked the proposals. A project score sheet was developed to rate how well each proposal addressed elements that included: readiness to proceed; addressing failing systems in the critical area; addressing other health and environment based factors; identifying onsite sewage disposal systems to be upgraded; partnerships and available resources to implement the proposal and how long-term issues of management are to be addressed. Ten proposals were submitted to MDE prior to the stated deadline and proposed awards were based on their project scores. MDE anticipates distributing 9 million dollars to ten different jurisdictions for approximately 700 septic system upgrades. These grants were approved by the Board of Public Works in December 2006.

Best Available Technology (BAT)

It was necessary to develop a procedure for determining which technologies should be considered grant eligible. The Governor's Advisory Committee has established a workgroup including local health and public works agencies and industry representatives, to develop specifications for approved OSDS technologies. Referred to as Best Available Technology (BAT) Workgroup, this group of professionals is responsible for establishing the procedures for determining what specific types of systems will be eligible for grants under the OSDS portion of the BRF. MDE and the BAT subcommittee reviewed programs in other states, published research and third party verification programs. Current research indicates that nitrogen discharges from OSDS can be reduced by 50 to 60 percent. The BAT workgroup has adopted a protocol used by the Environmental Protection Agency/Environmental Technology Verification (EPA/ETV) to establish a procedure to verify the performance of nitrogen reducing OSDS. Six proprietary technologies have been evaluated by the EPA/ETV program and are eligible for BRF funding in Maryland. Four additional proprietary technologies have submitted application to be eligible for BRF funds. A review team comprised of three engineers from MDE and one County Environmental Health Director are reviewing the applications to ensure that each technology has been third party evaluated to a standard at least as stringent as the EPA/ETV's.

Outreach

- MDE has developed a brochure entitled "The Bay Restoration Fund Onsite Sewage Disposal System User Information Guide". The brochure explains the Bay Restoration Fund and informs citizens how to apply for funding. The brochure is available on MDE's website, is being distributed to local health departments and is being distributed as part of MDE's inspection of onsite sewage disposal systems adjacent to shellfish harvesting waters.

- MDE produced the video, "Onsite Sewage Disposal Systems – Protecting Your System – Preserving the Bay". This video, which won a prestigious Aegis Award for video production, teaches homeowners about the care of septic systems and about the connection between septic systems and the Bay while also informing property owners about the availability of BRF funds to upgrade septic systems. To date approximately 5,000 copies of this video have been distributed to homeowners and demand for the video remains high.

- MDE staff regularly attend Tributary Strategy Meetings and meetings of all watershed associations to provide information on OSDS and the Bay Restoration Fund.

Permitting Programs

Ground Water Discharge

Ground water discharge permits are required for any discharges to ground waters of the State. Ground water discharges include spray irrigation land treatment systems, overland flow systems, rapid infiltration systems such as infiltration ponds, large (greater than a daily average flow of 5,000 gpd) on-site sewage disposal systems, seepage pits, dry wells, septic systems, and and injection wells. The Code of Maryland Regulations provides performance standards for location, design, installation, construction and maintenance of the permitted facilities. Issuing a permit involves the review of plans, specifications and hydrogeologic reports, and the evaluation of soil and site suitability. In many cases, ground water monitoring is a condition of the permit, requiring that a facility maintain primary or secondary drinking water standards in the ground water quality at the point of discharge or monitoring wells adjacent to the property boundary. In FY 2007, MDE issued 30 municipal ground water discharge permits and 17 industrial ground water discharge permits.

Hazardous Waste

The Hazardous Waste Program within MDE's Waste Management Administration maintains oversight of hazardous waste generators and hazardous waste treatment, storage and disposal facilities through State regulations and a federally mandated permit program. The permit program implements the requirements of the federal Resource Conservation and Recovery Act (RCRA) as well as the requirements of State law. In Maryland, there are approximately 10,500 facilities registered as generators of hazardous waste and approximately 21 facilities permitted to store, treat or provide disposal of controlled hazardous substances.

The Hazardous Waste Program relies on record keeping to maintain a "cradle to grave" tracking system for all hazardous waste generated. Proper management and pollution prevention techniques ensure against contamination of ground water. If improper management of hazardous waste occurs, the program requires that actions be taken to remedy the situation and to restore to the extent possible, the quality of the affected ground water. A strong oversight and enforcement effort is maintained to provide high visibility as a deterrent against future violations. Permitted hazardous waste treatment, storage, and disposal facilities whose operations would present a greater potential for ground water contamination if an unforeseen incident occurs are placed under more stringent permit conditions. Permit conditions in this case would include the requirement that a ground water monitoring system be deployed. The Hazardous Waste Program is charged with the responsibility of inspection of these systems and initiating enforcement action should the need arise. Using requirements for ground water protection defined in State regulations, permit requirements are tailored to address the potential for contamination presented by each facility. At a minimum, semi-annual reports are submitted by facilities required to monitor ground water. Failure to meet permit requirements results in an enforcement action designed both to bring the facility into compliance and to remediate any contamination.

The Hazardous Waste Program also maintains the Federal Facilities Division which is responsible for supporting cleanup at Federal Facilities under the CERCLA process. MDE

maintains a Department of Defense/State of Maryland Memorandum of Agreement, which provides federal funding to support the Division activities. The focus of the Federal Facilities Division activities at Department of Defense sites is on groundwater contamination. Evaluation of the extent of contamination, remedial alternatives, and ultimate cleanup criteria is through the CERCLA process. The Division directly supports EPA Region III in the CERCLA cleanups.

The Hazardous Waste Program, in collaboration with the Department's GIS Workgroup, is evaluating GIS capabilities for use as an enhancement tool in enforcement, permitting, pollution prevention, waste minimization and information management. The use of this tool will enable the program to define environmental pollution caused by the improper management of hazardous waste over time and relate those activities to environmental receptors or conditions. Further implementation of the GIS capability is contingent on the completion of MDE's Enterprise Information System (i.e. EEMS).

Oil Control

The Oil Control Program (OCP), within MDE's Waste Management Administration, is the unit responsible for the implementation of the Underground Storage Tank (UST), Leaking Underground Storage Tank (LUST), and Aboveground Storage Tank (AST) programs. These programs provide for preventive actions to minimize ground and surface water pollution from the storage of petroleum products. The Program has increased regulatory oversight of underground storage tanks with improvements to release detection, secondary containment, and tank monitoring.

To ensure the protection of groundwater resources and public health from the release of chemicals stored in underground storage systems OCP has enacted a specialized tank inspection program. Now an owner of an underground storage system in Maryland that holds motor fuel is required, upon notification from OCP, to have the storage system inspected by a certified private inspector. The inspector must visit the storage tank facility and complete a detailed site inspection form provided by OCP. The inspector evaluates items such as tank and piping release detection, overfill/spill prevention, and system corrosion protection, as well as facility housekeeping and other compliance concerns. Once a facility has had an initial inspection, follow-up inspections must occur every three years to confirm continued compliance with Maryland regulations.

The Oil Control Program also requires improved release detection methods for motor fuel facilities operating within the High Risk Groundwater Use Areas of Baltimore, Carroll, Cecil, Frederick and Harford County. Facilities within this area must sample the groundwater through at least three onsite monitoring wells. This sampling must be performed every six months and the results reported to OCP. The facility must also sample the site's water supply well and perform special release detection tests on any operational underground storage tank systems. Facilities that fail to perform these tests face MDE enforcement actions and the cut off of their fuel supply.

Solid Waste

The Solid Waste Program, within MDE's Waste Management Administration, regulates the management and disposal of non-hazardous waste such as municipal solid waste, industrial waste, construction and demolition waste, land-clearing debris, scrap tires, sewage sludge and natural wood waste. The program's comprehensive permitting requirements for facilities accepting waste are directed at protecting ground and surface water while assuring the safe management and disposal of waste. Program activities include significant enforcement efforts to stop and clean up illgal dumps before they can significantly impact groundwater resources. Permitting requirements include liners and leachate collection/treatment systems for landfills, except land clearing debris ("stump dump") landfills; ground water monitoring systems; and other environmental protection systems that serve to protect ground water. The program regulates 22 municipal solid waste landfills, 2 industrial waste landfills, 3 sewage sludge storage or treatment facilites, and 8 construction and demolition waste landfills; and evaluates environmental monitoring data for approximately 50 closed landfills.

The Solid Waste Program also oversees the utilization of sewage sludge that is applied as a soil amendment to farmland or used for the reclamation of land such as mined sites. Most of the sewage sludge generated in Maryland is applied to farmland. The beneficial use of this material is regulated by State statute and permit conditions that require buffers and nutrient management plans for farmland where sewage sludge is to be applied. By limiting the amount of nutrients applied to land to those actually required by crops, excess amounts of nutrients can be controlled and ground and surface water protected.

By eliminating unpermitted tire dumps and providing a regulatory program for the management, transportation and recycling of scrap tires, the Solid Waste Program prevents serious sources of pollution caused by "tire dump" fires, thus protecting ground and surface water. See the Department's annual Scrap Tire Report for more information on these activities.

Underground Injection Control

EPA delegated authority for the Underground Injection Control (UIC) program to Maryland in 1984. There are five classes of UIC wells. Maryland has primarily Class V wells, which are essentially shallow subsurface treatment and disposal systems, such as a septic system. These systems may receive treated industrial process wastewater, or the industrial wastewater may commingle with domestic sewage. MDE's Ground Water Discharge Program issues permits for Class V wells. Large capacity septic systems, defined in the Code of Federal Regulations as serving greater than 20 persons, are also defined as Class V wells and jointly permitted by the State's UIC Program and the County Health Departments. Disposal of hazardous waste by underground injection is not allowed in Maryland.

The UIC Program maintains a data inventory of potential and known Class V wells. It also actively seeks unpermitted wells for regulation and inventory through unannounced site

inspections by Program personnel, targeting unpermitted Class V wells. One inspector is dedicated to statewide inspections of facilities in unsewered areas, which may be using shallow disposal practices for industrial wastewater, and a second inspector works in coordination with the Water Supply Program to investigate potential dischargers in Wellhead Protection Areas (WHPAs). Notices of Violation are issued for facilities not in compliance with UIC Class V regulations. Corrective action is required for these facilities. Approximately 400 inspections are conducted each year. In addition, MDE Compliance inspectors visit the approximately 125 permitted facilities to monitor compliance with the conditions of the permit.

In FY 2007, 566 UIC inspections were conducted by the two MDE inspectors; of these, 191 were located in WHPAs. In FY 2007, 24 Notices of Violations were issued by these inspectors; of these, 7 were in WHPAs. In FY 2007, 27 facilities were returned to compliance; of these, 6 were in WHPAs.

The Program continues to distribute a brochure titled *A Dry Cleaner's Guide to Wastewater Management*. The brochure is available in three versions: English, Korean and Chinese. The brochure provides information on percholoroethylene (PCE) and guidance on PCE disposal in septic and sewer systems. The Program also created and is distributing a brochure on best management practices for handling vehicle wash water, and photo-processing wastewater.

The federal Phase I Class V Rule, which became effective April 5, 2000, bans new motor vehicle repair shop discharge wells and large capacity cesspools. There are no known large capacity cesspools in Maryland. Owner/operators of motor vehicle discharge Class V injection wells have the option to close their wells or to obtain a permit. This is consistent with Maryland's Plumbing Code regulations enacted October 20, 1997, via work by MDE's UIC Program. The Maryland Plumbing Code regulations, developed in coordination with the Department of Labor, Licensing, and Regulation (DLLR), allow automotive repair and related facilities to operate without a floor drain. If a floor drain is used to manage maintenance bay wastewater, it must be connected to a sanitary sewer, a holding tank or the facility must obtain a Class V injection well permit. Permitted Class V wells must meet primary and secondary drinking water standards.

On June 7, 2002, EPA published the Underground Injection Control Program Notice of Final Determination for Class V injection wells. This final determination covers all sub-classes of Class V wells not addressed in the Phase I Class V Rule. In this, EPA determined that additional federal requirements are not needed at this time, and that existing federal UIC regulations are adequate to protect underground sources of drinking water. Maryland has primacy for the UIC Program and MDE has the authority to require a permit for any Class V well that has the potential to endanger underground sources of drinking water.

Water Well Construction

Responsibility for permitting well construction is delegated by MDE to local county health officers or other county environmental officials. MDE staff oversee this delegated program and provide technical assistance to county personnel. Only drillers licensed by the

Maryland Board of Well Drillers may drill wells in the State. The driller must file a well completion report for each well, which is stored in a central computer database at MDE. The Department processes approximately 12,500 well permits each year. Based on the 1990 Census, approximately 316,000 households rely on individual wells. The On-Site Systems Division conducts well construction inspections in the field, trains well drillers and county personnel, and has been instrumental in developing enforcement cases for violations of well construction laws.

Pesticides Management

The Maryland Department of Agriculture (MDA) Pesticide Regulation Section, the State's lead agency for implementing the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), continues to implement, maintain and update, as needed, its generic Pesticide Management Plan (PMP). As an addendum to the PMP, the United States Environmental Protection Agency (EPA), in cooperation with the States, has developed a *State Pesticides of Interest* list. Pesticides of interest (including their degradates) have been identified by the States as pesticides that have the *potential* to occur in ground or surface water at concentrations approaching or exceeding a human health or ecological reference point. These pesticides are to be periodically evaluated to determine whether a human health or environmental reference point is likely to be approached or exceeded. If the evaluated pesticides are found to pose a risk to water quality, then that pesticide(s) must be actively managed. Management may include applicator training/public outreach, adoption of Best Management Practices (BMP's), targeted inspections and enforcement of existing water quality-related label restrictions, designation as a State "Restricted Use" pesticide due to water quality concerns, additional product label restrictions to reduce contamination or, ultimately, denial of State registration of the pesticide, due to water quality concerns. MDA has, once again, contracted with the United States Geological Survey (USGS) to produce a 4-8 page fact sheet summarizing the occurrence and distribution of commonly used pesticides in ground water. Candidate pesticides include atrazine, simazine, metolachlor, alachlor, chlorpyrifos, and diazinon. Pesticide occurrence and distribution will be related to use, chemical properties, hydrologic and geochemical characteristics of the Piedmont region by using existing data stored in the USGS database from NAWQA and MGS projects. The project should be completed by September 30, 2007.

For the fifteenth year, MDA is conducting a recycling program for empty pesticide containers. MDA, in cooperation with local government and private industry, inspects, stores and chips clean, empty pesticide containers that have been offered for recycling. Collection centers are maintained in seven counties (Frederick, Harford, Kent, Prince George's, Talbot, Washington and Wicomico) with the assistance of county government agencies. A total of 28 collection days are held during June through September. In addition, eleven pesticide dealers/custom applicators are participating in inspection and collection of containers at their own facilities. The program has been well received by different interest groups, including the agricultural community, EPA's Chesapeake Bay Program and environmental organizations. The long-term goal is to continue the program each year as allowed by the limited funding and personnel. Nearly 500,000 empty containers have been collected and recycled since 1993, taking more than 200 tons of plastic out of Maryland's waste stream.

MDA, in cooperation with the Maryland Department of the Environment, the University of Maryland Cooperative Extension and various agricultural organizations, offered an unusable/unwanted pesticide disposal program, for all agricultural producers, in the Eastern Shore Counties. MDA collected more than 20,000 pounds of unwanted or unusable pesticides from 30 participants. Since 1995, the program has collected more than 550 different pesticides producing nearly 150,000 pounds. MDA plans to offer the pesticide disposal program for agricultural producers in Baltimore, Carroll, Frederick, Harford, Howard and Montgomery Counties during the second half of FY 2007.

CONCLUSION

This report has documented activities by State agencies to protect, remediate and characterize Maryland's ground water resources. More data is collected and reviewed today than ever before to ensure the safety of water supplies and the long-term reliability of water sources before permitting their use. Water Management Administration and Waste Management Administration programs routinely exchange information to ensure the best possible decision-making with the goal of protecting both the resource and public health. Funding to support voluntary ground water protection programs (e.g., cover crop, wellhead protection and voluntary cleanup programs) is growing, and these programs are having greater impact than in the past. Regulations have significantly improved in their depth and scope over the past two decades, addressing more contaminants and requiring better protection measures. Technical capabilities have improved and continue to improve, both for collecting and organizing information as well as for improving water quality.

The challenges that Maryland will face in the upcoming years, however, remain daunting. New awareness about potential or existing contaminants, more complex regulations, a need for increased laboratory capacity, and the increasingly high costs for drilling monitoring wells and modeling ground water flow systems all place demands on limited financial resources. The costs associated with addressing the legacy of past contamination remain high. Maryland's growing population continues to place additional stresses on finite resources, and a better understanding of water availability is needed to ensure sound decisions when planning to meet the water needs for the future.

Maryland's varied hydrologic terrain works against the grain of a "one size fits all" solution for managing, protecting and restoring ground water. While some areas of the State may experience issues of quantity limitations, other areas experience problems due to naturally-occurring contaminants, or localized industrial or human-influenced contamination. Coordinating the many activities to preserve, protect, and enhance the State's ground water resource remains a challenging and much-needed effort. In FY 2008, MDE looks forward to continuing its work with the Advisory Committee on the Management and Protection of the State's Water Resources as the Committee works to identify and implement the best possible policies and activities to assure the long-term use and protection of Maryland's ground water resources. In addition, MDE anticipates working with the Department of planning to assist local planning agencies as they develop and implement the Water Resource Elements of their Comprehensive Plans.